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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,838	05/28/2002	Jan Kjellman	STOCP0122US	5757

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Don W Bulson
Renner Otto Boisselle & Sklar
19th Floor
1621 Euclid Avenue
Cleveland, OH 44115

EXAMINER

LEURIG, SHARLENE L

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,838	KJELLMAN ET AL.	
	Examiner	Art Unit	
	Sharlene Leurig	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 20-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 33-51 is/are allowed.
- 6) ☒ Claim(s) 1,3,5,9,11-13,15,17,21,22,24,26,28-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 2,4,6-8,10,14,16,18,20,23,25,27,31 and 52 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>012004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed on January 6, 2004 has been entered and acknowledged by the examiner. Claims 1, 2, 10, 13, 16, 17, 20, 21, 25-27, 30, 33, 40, 42, 45, 49 and 50 have been amended. Claim 19 has been cancelled. Claim 52 has been added.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 21, 22, 24, 26, 28, 29, 30 and 32 stand rejected under 35 U.S.C. 102(b) as being anticipated by Rabinowitz (5,764,004) (of record).

Regarding claim 21, Rabinowitz discloses a field emission cathode (Figure 1, element 11) for use in a light source and at least partially encompassed by an anode (15), the cathode being elongate and electrically conductive and being in cylindrical form with a first longitudinal axis, where at least a portion of the cylindrical surface has conductive surface irregularities in the form of carbon nanotubes (Figure 15, element 31), each having a second longitudinal axis perpendicular to the first longitudinal axis. Rabinowitz discloses the length of the nanotubes being about 10,000 nm, which is equivalent to 10 microns (column 18, lines 6-7). Since the nanotubes are partially

Art Unit: 2879

embedded in the cathode wire, the free ends of the nanotubes must be less than 10 microns.

Regarding claim 22, the wire can be made of tungsten, which is conductive (column 16, lines 8-9).

Regarding claim 24, the wire may be coated with a layer of polytetrafluoroethylene, in which the carbon nanotubes may be disposed, and therefore may be made of an insulating material (column 18, lines 16-20).

Regarding claim 26, the elongate carrier (Figure 15, element 21) has an essentially circular cross-section.

Regarding claim 28, the elongate carrier comprises a wire (column 16, lines 8-9).

Regarding claim 29, since rod can be interpreted as meaning "a long thin implement made of metal", and a wire also fits that description, the elongate carrier can be interpreted as being a rod (column 16, lines 8-9).

Regarding claim 30, the nanometers have a diameter of 10 nm and therefore have a radius of curvature in the range of 0.1 to 100 nm (column 18, lines 6-7).

Regarding claim 32, the nanotube tips are uniformly distributed around the carrier (Figure 15, element 31).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 5, 9, 11-13, 15 and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Rabinowitz (5,764,004) (of record) in view of Jones et al. (5,371,431) (of record).

Rabinowitz discloses a light source comprising an evacuated container having walls including an outer glass layer (Figure 1, element 16), a phosphor screen (14) forming a luminescent layer, and further comprising a conductive layer forming an anode (15). The phosphor is excited to luminescence when struck by electrons from the field emission cathode (11) located in the interior of the chamber. The field emission cathode (11) comprises an elongate wire-shaped carrier having a cylindrical surface and a first longitudinal axis, and carbon nanotubes are provided on the cylindrical surface perpendicular to the longitudinal axis of the cathode (Figure 15, element 31). Rabinowitz discloses the length of the nanotubes being about 10,000 nm, which is equivalent to 10 microns (column 18, lines 6-7). Since the nanotubes are partially embedded in the cathode wire, the free ends of the nanotubes must be less than 10 microns.

Rabinowitz lacks disclosure of a phosphor layer formed on the glass layer as a coating, instead disclosing a phosphor screen.

Jones teaches a phosphor coating on a glass wall as part of a display device (column 15, lines 21-22).

Therefore regarding claim 1, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Rabinowitz's light source with a phosphor

coating formed on the outer glass layer in order to obviate the need for an independent phosphor screen, as taught by Jones, and thereby lower the weight of the device.

Regarding claim 3, Rabinowitz discloses that the wire can be made of tungsten, which is conductive (column 16, lines 8-9).

Regarding claim 5, Rabinowitz discloses that the wire may be coated with a layer of polytetrafluoroethylene, in which the carbon nanotubes may be disposed, and therefore may be made of an insulating material (column 18, lines 16-20).

Regarding claim 9, Rabinowitz discloses that the elongate carrier (Figure 15, element 21) has an essentially circular cross-section.

Regarding claim 11, Rabinowitz discloses that the elongate carrier comprises a wire (column 16, lines 8-9).

Regarding claim 12, since rod can be interpreted as meaning "a long thin implement made of metal", and a wire also fits that description, the elongate carrier can be interpreted as being a rod (column 16, lines 8-9).

Regarding claim 13, Rabinowitz discloses that the nanometers have a diameter of 10 nm and therefore have a radius of curvature in the range of 0.1 to 100 nm (column 18, lines 6-7).

Regarding claim 15, Rabinowitz discloses that the nanotube tips are uniformly distributed around the carrier (Figure 15, element 31).

Regarding claim 17, Rabinowitz discloses that the anode (15), which is transparent (column 5, lines 5-6) is arranged between the glass layer (16) which is in

Art Unit: 2879

the form of a box and the luminescent layer (14) which is formed only on one side of the glass box.

Allowable Subject Matter

6. Claims 2, 4, 6-8, 10, 14, 16, 18, 20, 23, 25, 27, 31 and 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The reasons for indicating allowable subject matter were enumerated in the previous office action.

Claim 52 is considered to contain allowable subject matter as it depends on claim 20, which was indicated as containing allowable subject matter in the previous office action.

7. Claims 33-51 are allowed.

The reasons for allowance have been enumerated in the previous office action.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

8. Applicant's arguments filed January 6, 2004 have been fully considered but they are not persuasive. The applicant has argued that the claimed invention is allowable over the prior art of record because the Rabinowitz reference discloses an emissive cathode that combines both thermionic emission and field emission, and therefore is not a field emission cathode, as claimed.

The examiner disagrees with the applicant's arguments. While the examiner agrees that the Rabinowitz reference teaches an emissive cathode that combines thermionic emission with field emission, as disclosed in the portion of the disclosure quoted by the applicant, the examiner disagrees that the Rabinowitz reference discloses "a thermionic emission cathode", as argued by the applicant (page 9, paragraph 5). The Rabinowitz cathode does produce field emission, as disclosed numerous times (column 1, line 20; column 1, line 30; column 2, line 51). The second citation explicitly discloses that the carbon whiskers emit electrons via field emission. Furthermore, the applicant's claim does not preclude a combination of field emission and thermionic emission.

The applicant has further argued that there is improper motivation to combine the Rabinowitz reference with the Jones reference. The applicant argues that the examiner has failed to establish a prima facie case of obviousness, and specifically is silent as to a motivation to combine the references.

The examiner disagrees, and directs the applicant to the rejection, in which the examiner states that "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Rabinowitz's light source with a phosphor coating formed

Art Unit: 2879

on the outer glass layer in order to obviate the need for an independent phosphor screen, as taught by Jones, and thereby lower the weight of the device.” Therein the examiner provides a motivation for combining the references, namely to lower the weight of the device by providing a phosphor coating directly on the glass layer.

Furthermore, since the Rabinowitz reference discloses a field emission cathode as argued above, the combination of the references does teach each and every limitation of the rejected claims. Therefore the examiner maintains the rejections of claims 1, 3, 5, 9, 11-13, 15, 17, 21, 22, 24, 26, 28, 29, 30 and 32.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-

Art Unit: 2879

2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharlene Leurig



ASHOK PATEL
PRIMARY EXAMINER